

## **Surface slope metrology and interferometric wave front measurements on deformable soft x-ray mirrors performed in the laboratory and in-situ at-wavelength.**

**S. Yuan<sup>1</sup>, M. Church<sup>1</sup>, R. Celestre<sup>1</sup>, G. Morrison<sup>1</sup>, W. McKinney<sup>1</sup>, T. Warwick<sup>1</sup>, K. Goldberg<sup>2</sup>, V. Yashchuk<sup>1</sup>**

<sup>1</sup> *Advanced Light Source, Lawrence Berkeley Laboratory, Berkeley, California, United States*

<sup>2</sup> *Center for Xray Optics, Lawrence Berkeley Laboratory, Berkeley, California, United States*

We report on sub-micro-radian metrology techniques applied to deformable mirrors for soft x-rays. Precision measurements and mirror tuning are performed in the ALS optical metrology laboratory. Because of the need for tuning after installation at the beam line we are developing techniques for use in-situ and at-wavelength. Accurate geometric Hartmann tests are in use to determine the slope errors across the optic by restricting and selecting a sub-aperture. Shearing interferometry techniques are under development to measure the distortion of the wave front across the full aperture, after reflection.

These techniques make use of soft x-ray photons in the beam line, with energy low enough to be easily apertured, and high enough to avoid limitations due to diffraction; typically around 1keV.

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